

**CHAPTER 12****FOREST HABITAT TYPE CLASSIFICATION SYSTEM**

The forest habitat type classification system (FHTCS) is a site classification system based on the floristic composition of plant communities. The system depends on the identification of potential climax associations, repeatable patterns in the composition of the understory vegetation, and differential understory species. It groups land units with similar capacity to produce vegetation. The floristic composition of the plant community is used as an integrated indicator of those environmental factors that affect species reproduction, growth, competition, and community development. This classification system enables the recognition of ecologically similar landscape units and vegetation communities. It is a system to classify forest plant communities and the sites on which they develop.

A forest habitat type is an aggregation of sites (units of land) capable of producing similar late-successional (potential climax) forest plant communities. Each recognizable habitat type represents a relatively narrow segment of environmental variation that is characterized by a certain limited potential for vegetation development. Although at any given time, a habitat type can support a variety of disturbance induced (seral) plant communities, the ultimate product of succession is presumed to be a similar climax community. Field identification of a habitat type provides a convenient label (habitat type name) for a given site, and places that site in the context of a larger group of sites that share similar ecological traits.

Individual forest cover types usually encompass a wide range of environmental conditions and do not accurately reflect site potential or respond predictably to given management techniques. In contrast, a habitat type is a group of ecologically similar sites in terms of vegetation potentials. Cover types combined with habitat types can comprise plant community types. Management interpretations can be refined and made significantly more accurate by evaluating a stand in terms of the current cover type (current dominant vegetation) plus the habitat type (potential vegetation).

Forest managers are often charged with the challenging task of assessing site potential and variability when developing management prescriptions and plans for forest stands and properties. The FHTCS provides a tool to improve the process of assessing site potential and evaluating management alternatives. Through application of the FHTCS, land managers are better able to assess site capabilities, identify ecological and silvicultural alternatives, predict the effectiveness of possible silvicultural treatments, evaluate feasible management alternatives, and choose appropriate management objectives.

The forest habitat type classification system serves the following basic functions:

- Management Interpretation -- It enables resource managers to develop long-term management objectives and specific prescriptions for manipulating vegetation based on knowledge of the ecological potential of the land.
- Communication - It provides managers and researchers with a common language for describing forest communities and sites.
- Research - It provides a framework for systematic gathering and interpretation of research data and empirical knowledge.

The Wisconsin Forest Accord is an agreement developed (1994) among agencies, forestry organizations, and conservation groups to provide support for the continued development, evolution, and application of the FHTCS and the National Hierarchical Framework of Ecological Units (NHFEU). It clarifies that these two ecological classification systems share objectives, are complementary, and can work together to achieve better resource communication. The FHTCS facilitates consistent assessment of ecological potentials; it provides a common language for interpreting site capabilities based on potential natural vegetation. The NHFEU divides landscapes into ecologically significant regions at multiple scales and facilitates ecosystem analysis, landscape assessment and planning, and inter-State communication and coordination. The FHTCS provides the vegetative component of the NHFEU in Wisconsin. Development of the Forest Accord has proven valuable in maintaining a consistent approach over time.

**Wisconsin FHTCS Resources for System Application and Management Interpretation**

- *A Guide to Forest Communities and Habitat Types of Northern Wisconsin*, second edition, 2002, by John Kotar, Joseph A. Kovach, and Timothy L. Burger. Available through the University of Wisconsin-Madison, Department of Forest Ecology and Management.
- *A Guide to Forest Communities and Habitat Types of Central and Southern Wisconsin*, 1996, by John Kotar and Timothy L. Burger. Available through the University of Wisconsin-Madison, Department of Forest Ecology and Management.

- *Analysis of the 1996 Wisconsin Forest Statistics by Habitat Type*, 1999, by John Kotar, Joseph A. Kovach, and Gary Brand, USFS General Technical Report NC-207. Available through the USDA USFS North Central Research Station, St. Paul, Minnesota.
- *Wisconsin Forest Habitat Type Program*, 2004, by Peter Kourtz, John Kotar, Joseph Kovach, and Timothy Burger. Available through the Wisconsin Department of Natural Resources, Division of Forestry, Madison, Wisconsin.

### **Habitat Type Guides**

The two Wisconsin habitat type guides apply to most upland forest sites and communities. Habitat types have not been defined for forested lowlands (poorly drained soils), some southern wet-mesic sites (somewhat poorly drained loams), or for some unusual (of relatively minor extent) forest site types. The guides outline basic concepts and methodologies. They include step-by-step instructions of how to accurately determine habitat types in the field with the use of the keys and tables. Plant identification is a skill critical to successful habitat type identification, therefore photographs and drawings of important understory plants are displayed. The guides include detailed ecological information pertaining to individual habitat types, groups of similar habitat types, and regional associations. Habitat types are described in terms of distribution, landforms and soils, common cover types, development of understory features, disturbance history, successional patterns, and management implications. In addition, the habitat type groups are similarly characterized and general management interpretations are presented. Each of the 11 habitat type regions is characterized individually. These two guides provide the basis for applying and interpreting the forest habitat type classification system in Wisconsin.

### **Habitat Type Software**

The Wisconsin Forest Habitat Type Program provides electronic version of most of the information contained in the two habitat type guides, and a program to identify habitat types based on entered plant lists. The information contained in the two habitat type guides has been synthesized and reorganized to limit repetition and to facilitate presentation and navigation within the electronic format. The plant photo library has been expanded.

The program to identify habitat types depends on individual plant lists that are compiled from relatively homogeneous forested sites. Most major vascular plants must be correctly identified. When accurate plant lists are collected and entered correctly, the program will correctly identify the habitat type about 80-90% of the time, which is similar to the expected accuracy of most well trained field users. The second most likely habitat type is also identified, and the level of confidence in the computerized classification is presented. In application, the program can be utilized to confirm, check, or provide a "second opinion" of field designations. It also can facilitate the relatively rapid collection of large amounts of data by eliminating the need for field identification of habitat types; plant lists can be collected rapidly from many sites and then habitat type designation can proceed electronically. The program can help reduce significant habitat type identification errors associated with system misapplication by untrained users.

This software is available on compact disc, and can be utilized through a disc drive or copied to a hard drive. Instructions (field and computer applications) and documentation are included. This software is not intended to replace the guides; it is intended to augment the classification system in Wisconsin.

### **Habitat Types and Forestry Inventory and Analysis (FIA)**

During the early 1990's most FIA forest land field plots and condition classes were visited to identify habitat types and collect plant species lists. Approximately 5600 plots were evaluated. The FIA analysis publication contains summaries and discussions of major statewide trends and management implications. Various forest attributes are summarized by habitat type. Detailed charts and tables are provided.

### **Habitat Type Regions**

The Wisconsin FHTCS subdivides the state into 11 habitat type regions (5 northern and 6 southern) to facilitate habitat type identification and interpretation (Figures 12.1 and 12.2). In addition, Door County (region 4) and the Baraboo Hills (region 7) are treated as unique subregions. Geographic floristic variation exists and warrants the delineation of region-specific floristic groupings (abstract associations). This approach allows for the construction of more reliable floristic identification keys and more precise descriptions of habitat type characteristics. Regional division is based on climate, geology, soils, physiography, and plant community composition. Because landscape floristic variation tends to be gradational, rather than

abrupt, precise regional boundaries are difficult to determine. For convenience, counties were grouped into regions in such a way that each region can be characterized by at least one major natural feature. However, these regional boundaries are soft, and adjoining regions should be considered when applying the FHTCS near boundaries.

Figure 12.1. Wisconsin's 11 habitat type regions.

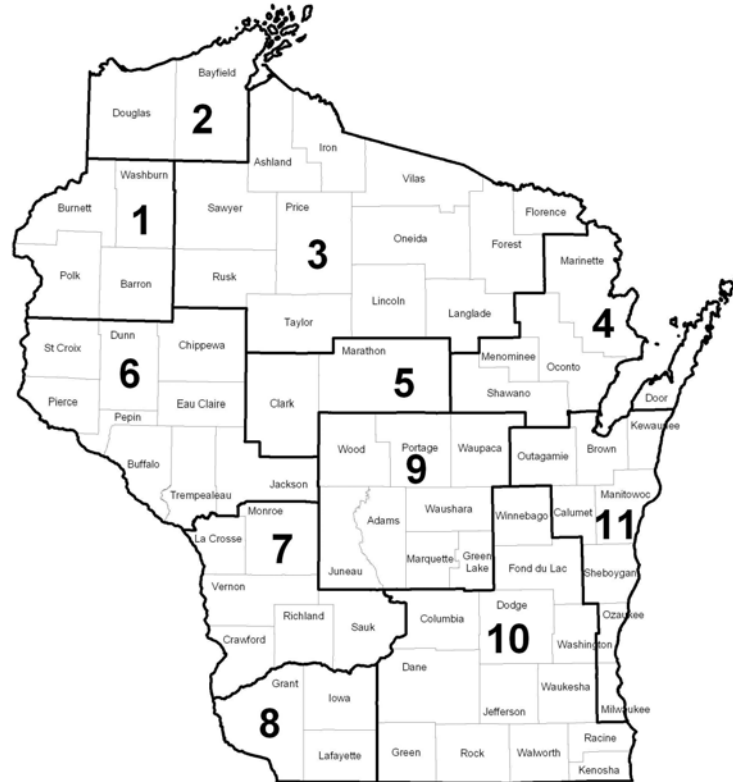
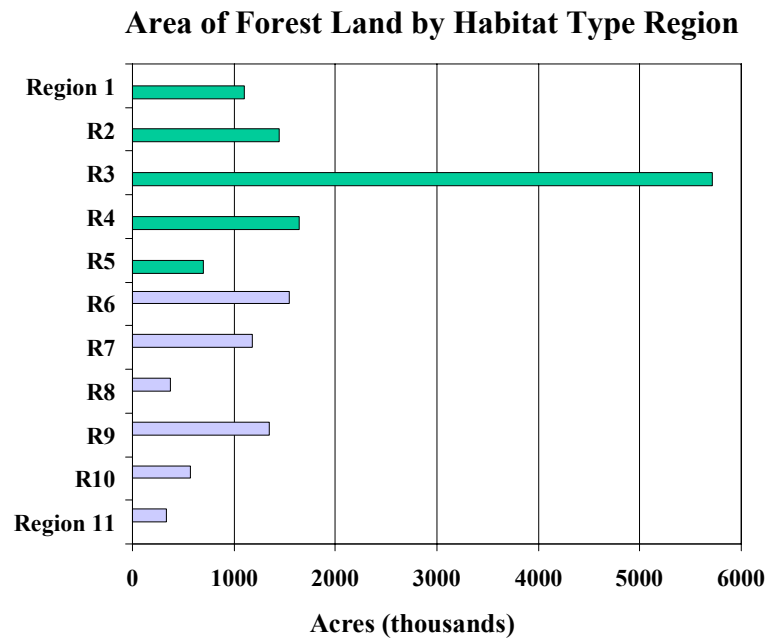


Figure 12.2. Area of forest land by habitat type region based on 1996 FIA.



### Habitat Type Naming

Habitat types are named based on species characteristic of the potential climax community type or association. The habitat type name includes the name of the tree species most capable of perpetuating itself in the absence of disturbance, and the name of a characteristic or diagnostic understory species of that site type. An example habitat type name is *Acer saccharum*/*Hydrophyllum virginianum* (Sugar maple/Virginia waterleaf). The first part of the name (preceding the slash) represents the dominant tree species in the potential climax association. The second part of the name (following the slash) represents a characteristic and differential understory species. Sometimes two or three co-dominant climax tree species or two understory species are used in the name, resulting in a lengthy designation. Therefore, for brevity and convenience, abbreviations are normally used. For the preceding example, the abbreviation is AH.

It must be emphasized that habitat types are characterized by specific **plant associations** (definite combinations of species with predictable frequencies of occurrence relative to one another). Habitat types are NOT defined by individual "indicator" species. Casual users of the system often overlook this distinction. This can lead to misidentification of the habitat type and ultimately to mismanagement.

### Habitat Type Groups

Habitat types that represent similar positions on the moisture-nutrient gradient can be grouped. Within regions, some habitat types are more similar than others and for convenience can be grouped to discuss similar management interpretations. Between regions, floristically different habitat types can occupy similar positions on the moisture-nutrient gradient and be similar in terms of management implications. These similar habitat types have been organized into six northern groups and eight southern groups. The general position on the moisture-nutrient gradient of the habitat type groups and examples of some of the habitat types that comprise the groups are shown in Figures 12.3, 12.4, and 12.5. Following these three figures is a short description of each of the 14 habitat type groups. The area of forest land represented by each habitat type group and the average growing stock volume per acre that occurred on each group based on 1996 FIA are shown in Figures 12.6 and 12.7. The representation of major tree species across and within northern habitat type groups and their relative growth potentials are shown in Figures 12.8, 12.9, and 12.10; similar representations based on FIA data have not been developed for the southern groups. Tables 12.1 and 12.2 list all delineated habitat types by region and habitat type group.

Figure 12.3. Relationship of habitat type groups to soil moisture and nutrient regimes in the northern and southern regions of Wisconsin. The position of each group is a composite of several individual habitat types. Forest lowlands (wet-mesic to wet habitat type groups 6 and 14) are not included, because habitat types have not been defined.

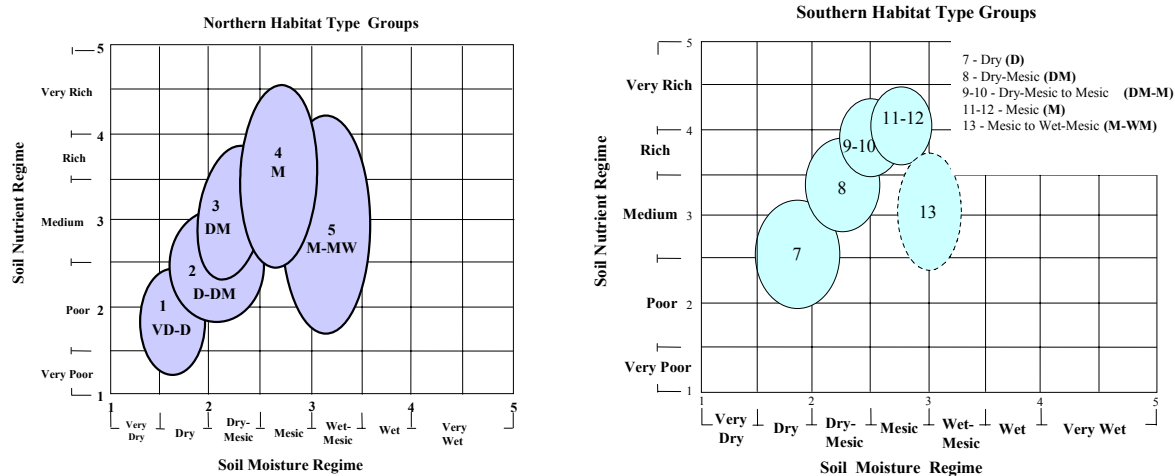


Figure 12.4. Habitat types comprising the northern mesic habitat type group (4), and their relationship to soil moisture and nutrient regimes.

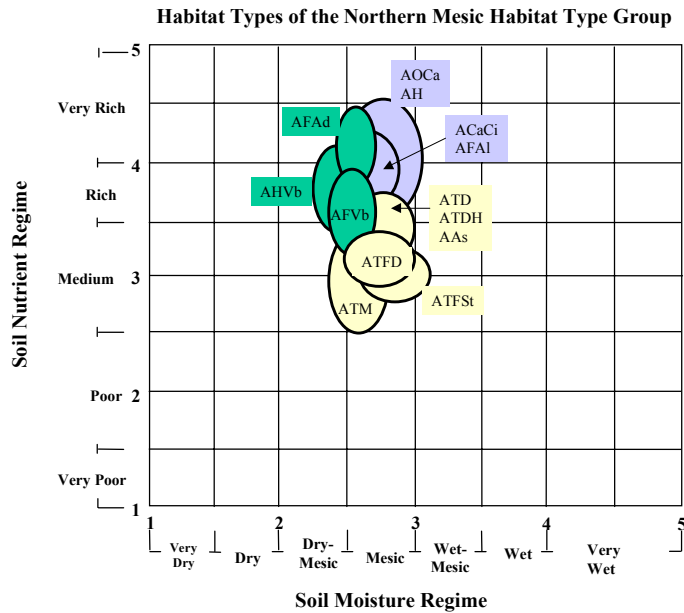
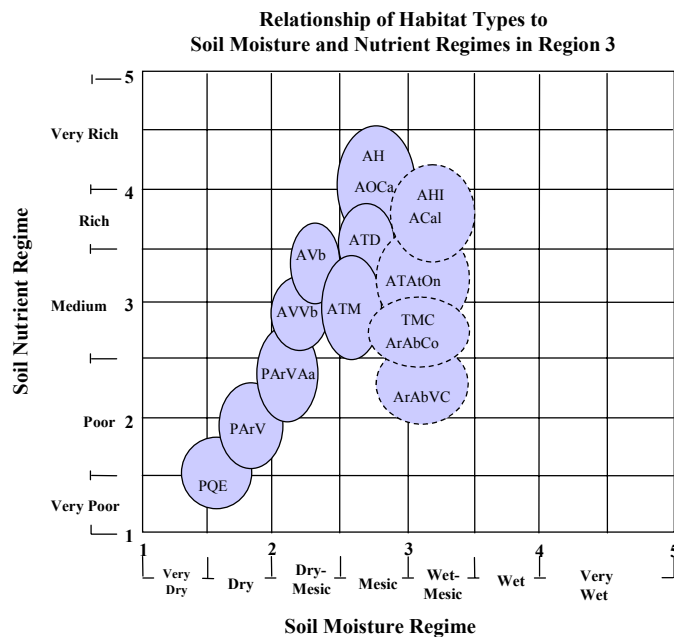


Figure 12.5. Habitat types of Region 3 (part of groups 1-5), and their relationship to soil moisture and nutrient regimes.



A. Northern Habitat Type Groups

1. Very Dry to Dry (VD-D) and nutrient poor

Habitat Type Series: White pine – Oak, White pine – Red maple

Habitat Types: PQE, PQG, PQGce, PArV, PArV-U, PArVAo, QAp

This group represents the driest and most nutrient poor sites of the northern regions. Forests typically are dominated by pines (primarily jack and red) and poor to fair quality oak and aspen. White pine is sufficiently drought and shade tolerant, that where seed sources exist, it can assert dominance (with red maple and oak) in undisturbed middle to late successional stands. Red maple is the most shade tolerant species found on these sites, however it is intolerant of fire, relatively short lived, and as the sites become droughtier, development becomes poorer.

2. Dry to Dry-mesic (D-DM) and nutrient poor to medium

Habitat Type Series: White pine – Red maple

Habitat Types: PArVAm, PArVHa, PArVAa, PArVAa-Vb, PArVAa-Po, PArVPo

This group is a step up on the soil moisture-nutrient gradient from the preceding group. Forests typically are dominated by some mix of white pine, red pine, aspen, white birch, red oak, and red maple. White and red pine thrive on these types. White pine is sufficiently shade tolerant to reproduce naturally in mixed stands. Red maple is the most shade tolerant species found on these sites, however, compared to white pine, it is relatively short lived, small of stature, and less adapted to fire.

3. Dry-mesic (DM) and nutrient medium

Habitat Type Series: Sugar maple, Sugar maple – Hemlock – Beech

Habitat Types: AVVb, AVCl, TFAa, AVDe, AVb-V, ACI, AVb, AAt, ATFPo

Soil moisture and nutrients are adequate to support shade tolerant, mesic species such as sugar maple, basswood, and white ash, but not at their optimal developmental levels. Following major disturbance (e.g. fire, wind, logging), aspen, white birch, red oak, red maple, or white pine often assume dominance. Without significant disturbance, stands on these types tend to gradually succeed to mesic hardwoods.

4. Mesic (M) and nutrient medium to rich

Habitat Type Series: Sugar maple, Sugar maple – Hemlock, Sugar maple – Hemlock – Beech,  
Sugar maple – Beech,

Habitat Types: AFVb, ATM, ATFSt, ATFD, AAs, ATD, ATDH, AHVb, AFAd, AFAl, ACaCi, AOCa, AH

This group represents the most favorable soil moisture-nutrient conditions in the region. Sugar maple and basswood are the most common dominants. Less shade tolerant species; such as aspen, white birch, red oak, and white pine; can gain temporary dominance only after a major disturbance, especially fire. Other common associates include red maple, white ash, yellow birch, hemlock, fir, and white spruce.

5. Mesic to Wet-mesic (M-WM) and nutrient poor to rich

Habitat Type Series: White pine – Red maple, Red maple – Balsam fir, Red maple,

Sugar maple – Hemlock, Sugar maple

Habitat Types: PArVRh, ArAbVC, ArAbVCo, ArVRp, ArAbSn, ArAbCo, TMC, AAtRp, ASnMi, ATAtOn, ASaI, ACaI, AHI

This group typically occurs on somewhat poorly drained mineral soils (sands, loams, and clays), and represents a transition from upland to lowland forest. Because of the wide range of nutrient conditions, many species and cover types can occur. Early successional stands dominated by aspen or red maple (and sometimes white birch) currently are most common. In the absence of major disturbance, red maple, balsam fir, and white pine can exert dominance on the more nutrient poor sites, whereas mesic hardwoods (sugar maple, red maple, basswood, ashes, yellow birch) and hemlock can exert dominance on the more nutrient rich sites.

6. Wet-mesic to Wet (WM-W)

Habitat Type Series: none delineated

Habitat Types: none delineated

These are forested lowland sites. No specific habitat types have been delineated. Forests are dominated by swamp conifers (white cedar, balsam fir, black spruce, tamarack) and swamp hardwoods (black ash, red maple, aspen).

B. Southern Habitat Type Groups

7. Dry (D) and nutrient poor to medium

Habitat Type Series: White pine – Oak, White pine – Red maple

Habitat Types: PEu, PVGy, PVHa, PVCr, PVG

These types represent dry, relatively nutrient poor sandy soils, most commonly occurring within and around the central sands region. Pines, oaks, and aspen comprise most stands.

8. Dry-mesic (DM) and nutrient medium to rich

Habitat Type Series: Red maple, Sugar maple – Red maple, Sugar maple

Habitat Types: ArDe-V, ArDe, AQVb-Gr, ArCi, ArCi-Ph, AArVb, AArL

These habitat types represent better growth conditions for oaks and pines. Red maple also competes more strongly, and in the absence of major disturbance (e.g. fire, wind, logging) can assert dominance in late successional stands. Sugar maple does not compete well on these types, and its seed source generally is lacking.

9. Dry-mesic to Mesic (DM-M) and nutrient rich

Habitat Type Series: Sugar maple – Basswood – White ash

Habitat Types: ATiFrCi, ATiFrVb, ATiDe-Ha, ATiDe-As, ATiDe, AFrDe, AFrDeO

Red and white oaks grow well on these habitat types, and make up the largest volume in many present stands. Soil moisture and nutrient levels are adequate to support good growth of mesic hardwoods. In the absence of major disturbance and if seed sources are present, the mesic hardwoods can dominate late successional stands.

10. Dry-mesic to Mesic, Phase [DM-M(P)]

Habitat Type Series: Sugar maple – Basswood – White ash

Habitat Types: ATiDe(Pr), ATiFrVb(Cr), AFrDe(Vb), ATiCr(O), ATiCr(As)

These types represent soil conditions similar to those of the preceding group, but they experienced more frequent fires prior to European settlement. As a result, mesic hardwoods have been virtually eliminated from the landscape, and currently are not replacing oaks or other less tolerant species that dominate current stands.

11. Mesic, Phase [M(P)]

Habitat Type Series: Sugar maple – Basswood – White ash

Habitat Types: ATiFrCa(O), ATiAs(De)

These habitat types occupy soils similar to those of the following group, but they experienced more frequent fires prior to European settlement. As a result, mesic hardwoods have been virtually eliminated from the landscape, and currently are not replacing oaks or other less tolerant species that dominate current stands.

12. Mesic (M) and nutrient rich

Habitat Type Series: Sugar maple – Basswood – White ash, Sugar maple – Hemlock – Beech,

Sugar maple – Hemlock, Sugar maple – Beech

Habitat Types: ATiSa-De, ATiSa, ATTr, AFTD, AFH, ATiFrCa, ATiCa-Al, ATiCa-La, ATiCa, AFAs, AFAs-O, ATiH

This group represents mesic, nutrient rich sites that experienced relatively little fire disturbance prior to European settlement and continue to be dominated by mesic hardwoods. Management by light partial cutting and passive management favor sugar maple dominance.

13. Mesic to Wet-mesic (M-WM) and nutrient poor to rich

Habitat Type Series: White pine – Red maple, others not delineated

Habitat Types: PVRh, others not delineated

With one exception, specific habitat types have not been delineated. This group typically occurs on somewhat poorly drained mineral soils, and represents a transition from upland to lowland forest. Nutrient regimes can range from relatively poor on damp, sandy soils to relatively rich on damp, silty soils. Currently, stands are most commonly dominated by red maple, ashes, oaks, basswood, and aspen. In the absence of major disturbance, red maple and white pine can exert dominance on the nutrient poor sites, whereas mixed hardwoods can exert dominance on the richer sites.

14. Wet-mesic to Wet (WM-W)



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Habitat Type Series: none delineated

Habitat Types: none delineated

These are forested lowland sites. No specific habitat types have been delineated. Forests are dominated by bottomland hardwoods, swamp hardwoods, and swamp conifers.

Figure 12.6. Area of forest land by habitat type group based on 1996 FIA

Approximately 2/3 of Wisconsin's forest land area is associated with northern habitat types, while 1/3 is associated with southern types. Three northern groups; M, M-WM, and WM-W; are predominant, and taken together represent nearly one-half of the total forest land base.

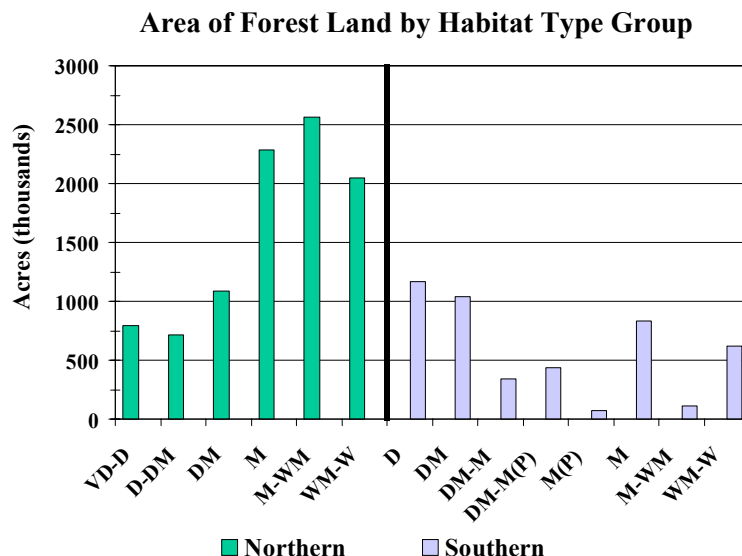


Figure 12.7. Growing stock volume per acre by habitat type group based on 1996 FIA

These volumes reflect the productive capacity of habitat type groups and collective management history. For the northern groups, the trends are reflecting primarily productive capacity. In the south, the effects of management history and pre-European settlement conditions are more evident, particularly in the two phase (P) groups.

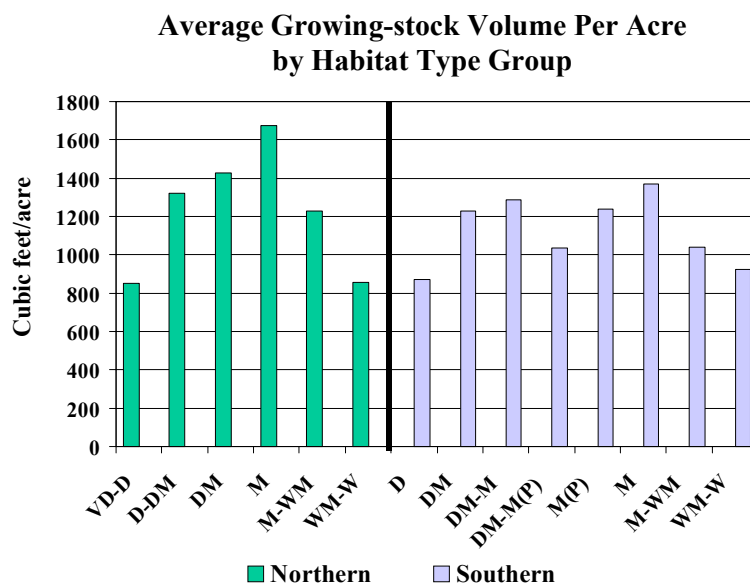


Figure 12.8. Representation of major tree species **across** (read in rows) northern habitat type groups as a percentage of species' total growing stock volume. Based on 1996 FIA. Numbers in parentheses are acres in thousands.

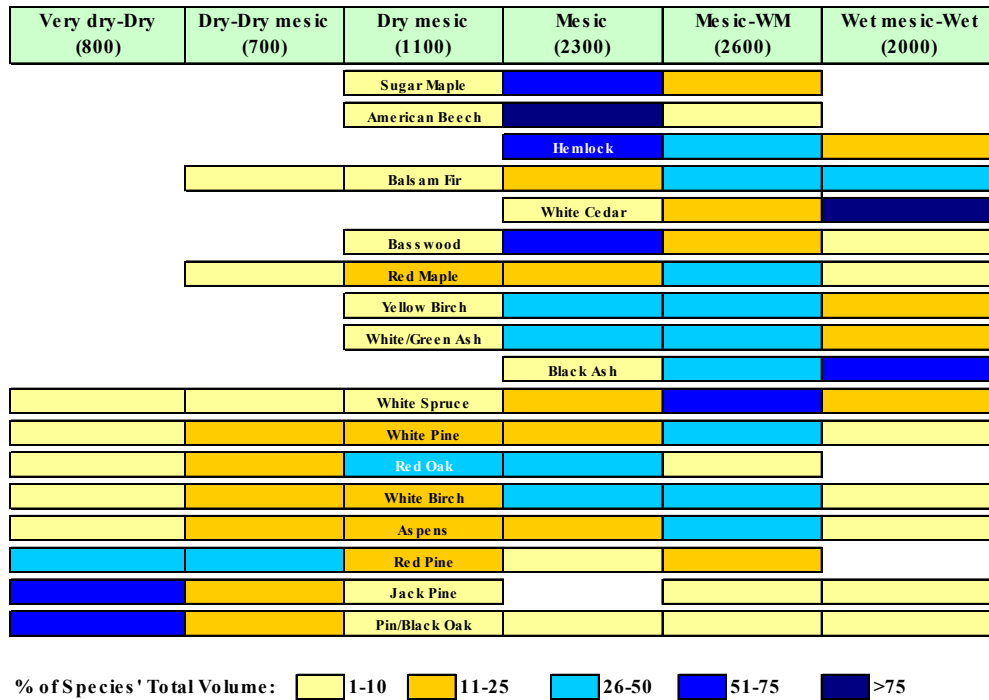


Figure 12.9. Representation of major tree species **within** (read in columns) northern habitat type groups as a percentage of total growing stock volume. Based on 1996 FIA.

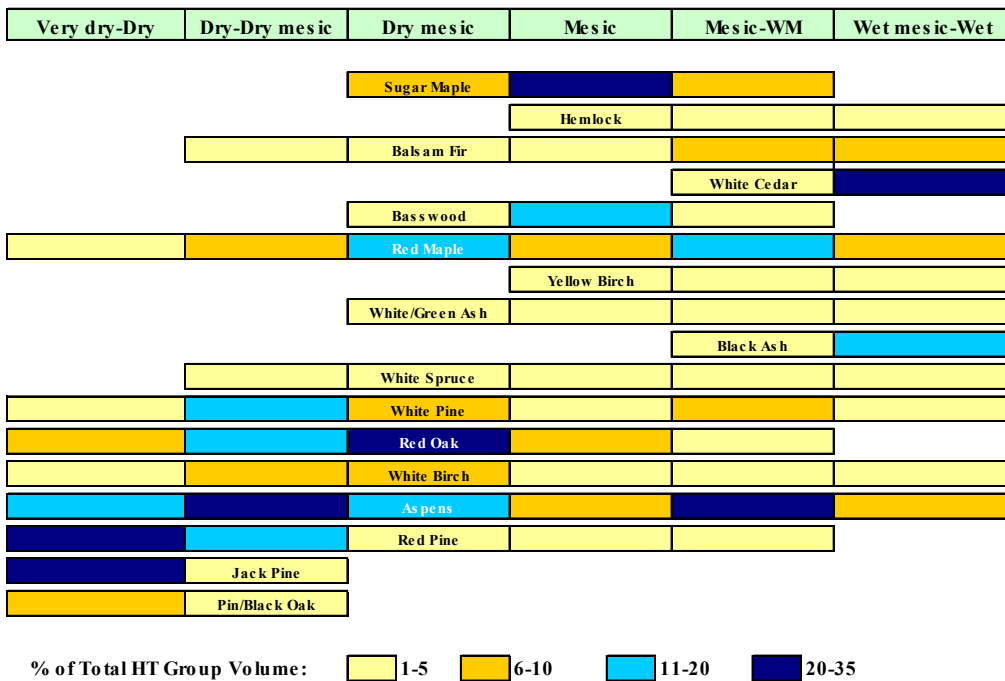
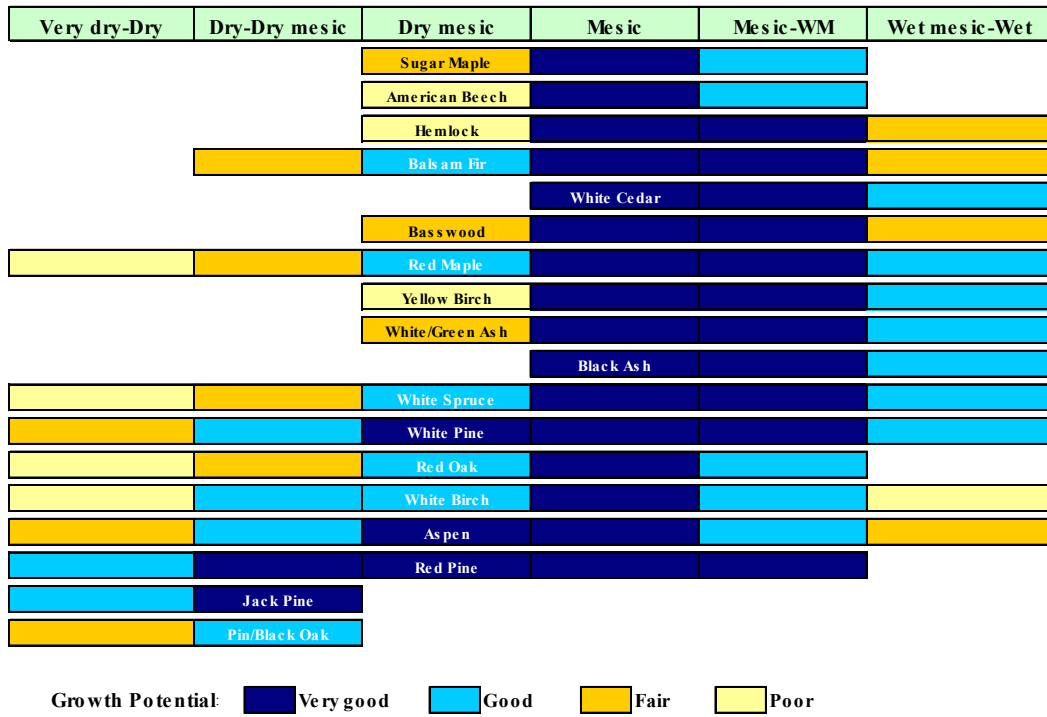


Figure 12.10. Relative growth potential of major tree species across northern habitat type groups. Only those habitat types where the species occurs naturally are considered.



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Table 12.1. Northern habitat types by group and region.

Within habitat type groups, habitat types are arranged top to bottom , from drier/poorer to moister/richer.

Types in different regions, but located on the same line are most similar in terms of management implications.

Habitat Type Group	Region 1	Region 2	Region 3	Region 4	Door Co.	Region 5
Very Dry to Dry	PQGCe QAp	PQG PArV-U	PQE PArV	PArVAo		
Dry to Dry-mesic	PArVAm	PArVAa-Po	PArVAa	PArVAa-Vb,PArVPo		PArVHa
Dry-mesic	AVDe AAt	AVCl ACl	AVVb AVb	AVb	TFAa ATFPo	AVb-V AVb
Mesic	ACaCi	ATM  AAs	ATM  ATD AOCa, AH	ATM AFVb ATFD ATDH AFAd AH	ATFSt  AFAI	ATM  AHVb AH
Mesic to Wet-mesic	ArVRp  ASaI	ArAbVCo ArAbSn AAtRp ASnMi	ArAbVC  TMC, ArAbCo  ATAtOn ACaI, AHI	ArAbVC  TMC  ATAtOn AHI		PArVRh  TMC  ATAtOn AHI

Table 12.2. Southern habitat types by group and region.

Within habitat type groups, habitat types are arranged top to bottom , from drier/poorer to moister/richer.

Types in different regions, but located on the same line are most similar in terms of management implications.

Habitat Type Group	Region 6	Region 7	Baraboo	Region 8	Region 9	Region 10	Region 11
Dry	PVGy PVHa, PVCr	PVGy PVCr			PEu PVG		
Dry-mesic	ArDe-V AArVb ArCi, ArCi-Ph	ArDe-V ArCi-Ph	ArDe-V AArL		ArDe AQVb-Gr		
Dry-mesic to Mesic		ATiDe(Pr) ATiDe	ATiDe-Ha ATiDe-As	ATiCr(O), ATiCr(As)	ATiFrCi	ATiFrVb(Cr) ATiFrVb	AFrDe, AFrDe(Vb) AFrDeO
Mesic	ATiSa-De ATiCa-La	ATiSa ATiCa	ATTr ATiCa-Al	ATiAs(De) ATiH		ATiFrCa(O) ATiFrCa	AFTD, AFH AFAs, AFAs-O
Mesic to Wet-mesic	PVRh	PVRh					